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(54) **COMMUNICATION APPARATUS, CONTROL METHOD THEREOF, AND STORAGE MEDIUM**

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H04L 12/50	(2006.01)
G06F 3/12	(2006.01)
H04L 29/12	(2006.01)
H04L 29/08	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/1285*** (2013.01); ***G06F 3/122*** (2013.01); ***G06F 3/1215*** (2013.01); ***G06F 3/1231*** (2013.01); *G06F 3/1203* (2013.01); *H04L 29/12028* (2013.01); *H04L 29/12226* (2013.01); *H04L 61/103* (2013.01); *H04L 61/2015* (2013.01); *H04L 67/025* (2013.01)

(58) **Field of Classification Search**

CPC H04L 61/00; H04L 61/20; H04L 61/2038; H04L 61/2092; H04L 69/22; H04L 12/28; H04L 61/10; H04L 61/25; H04L 61/103; H04L 61/2015; H04L 63/0236; H04L 67/025; H04L 29/12028; G06F 3/1288; G06F 3/1293; G06F 3/122; G06F 3/1215; G06F 3/1231; G06F 3/1285; G06F 3/1203

USPC 358/1.15; 709/222, 227; 370/474, 392, 370/357

See application file for complete search history.

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(57) **ABSTRACT**

An apparatus receives and analyzes a packet transmitted via a network, and performs network setting according to data included in the packet. Further, if it is determined that the received packet is a packet addressed to the apparatus and is not a setting packet for the network setting, the apparatus is controlled not to analyze the packet.

14 Claims, 11 Drawing Sheets

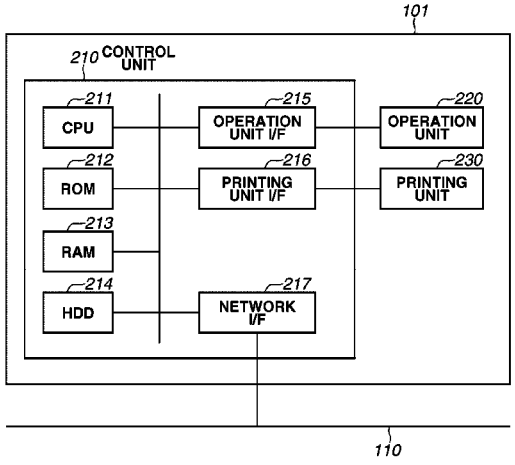

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FIG.1

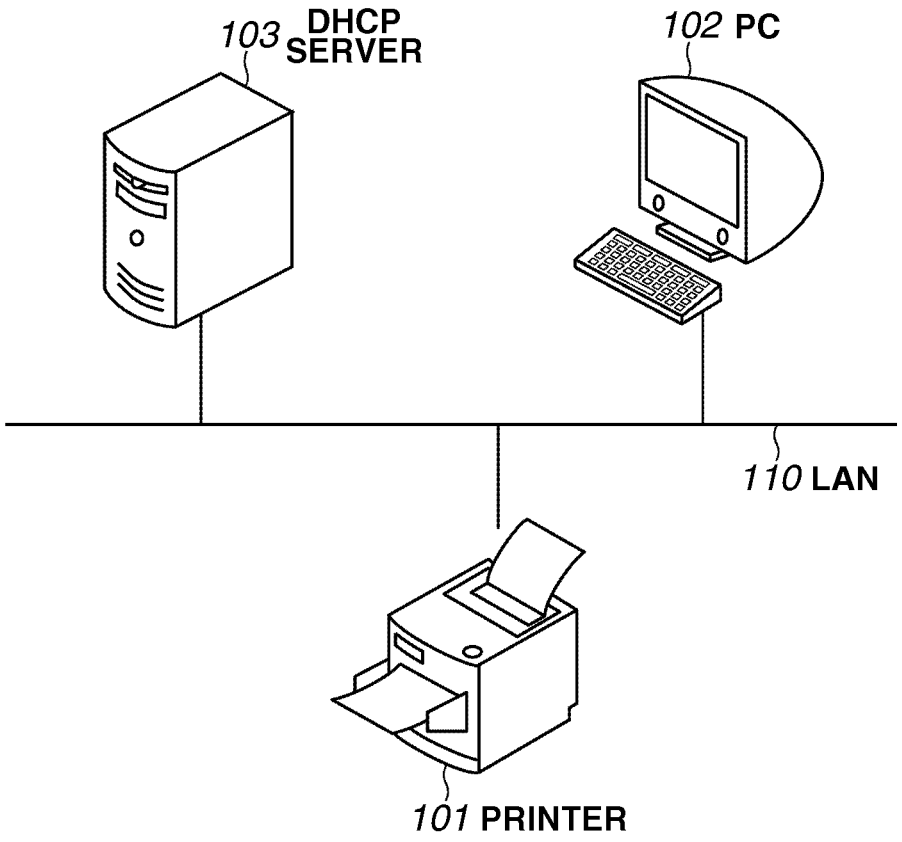


FIG.2

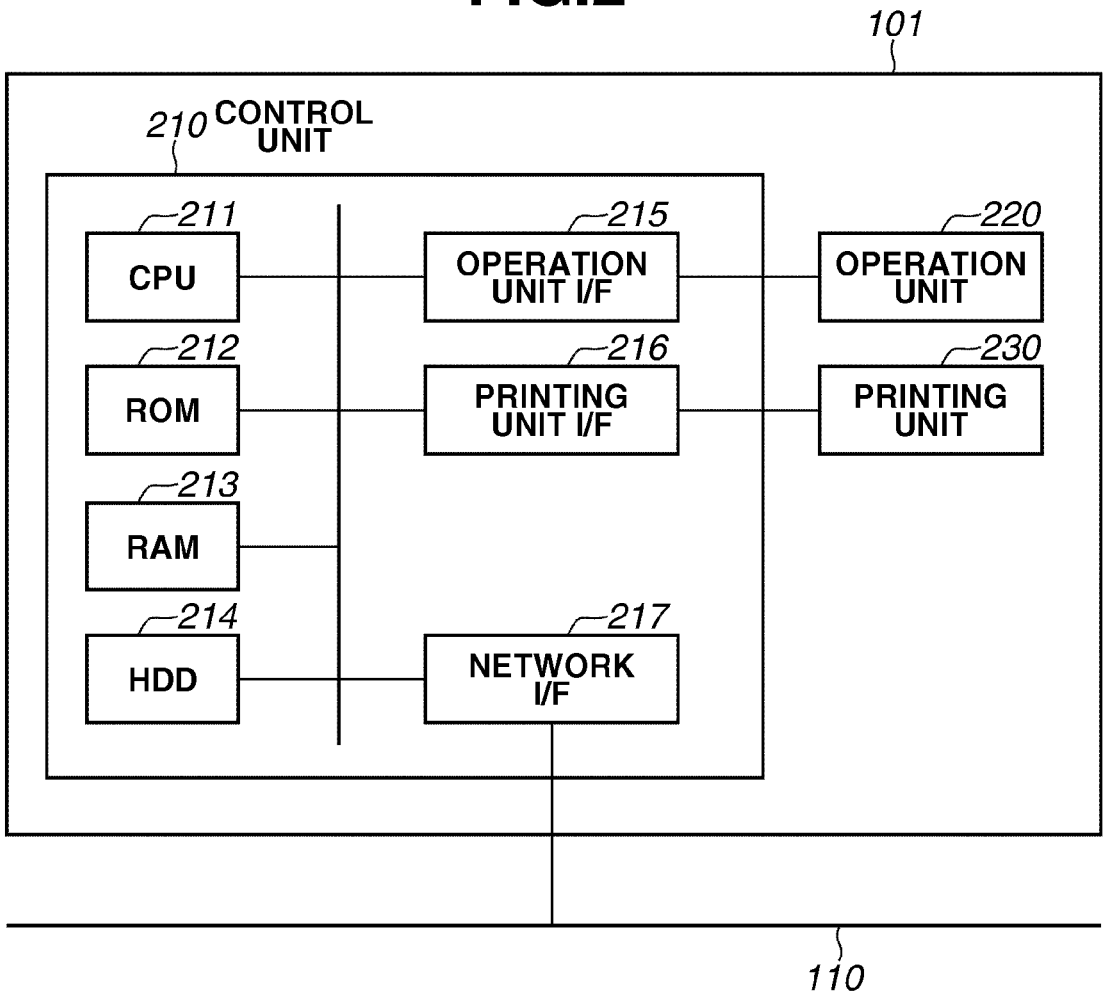

101
210 CONTROL UNIT
211
CPU
212
ROM
213
RAM
214
HDD
215
OPERATION UNIT I/F
216
PRINTING UNIT I/F
217
NETWORK I/F
220
OPERATION UNIT
230
PRINTING UNIT
110

FIG.3

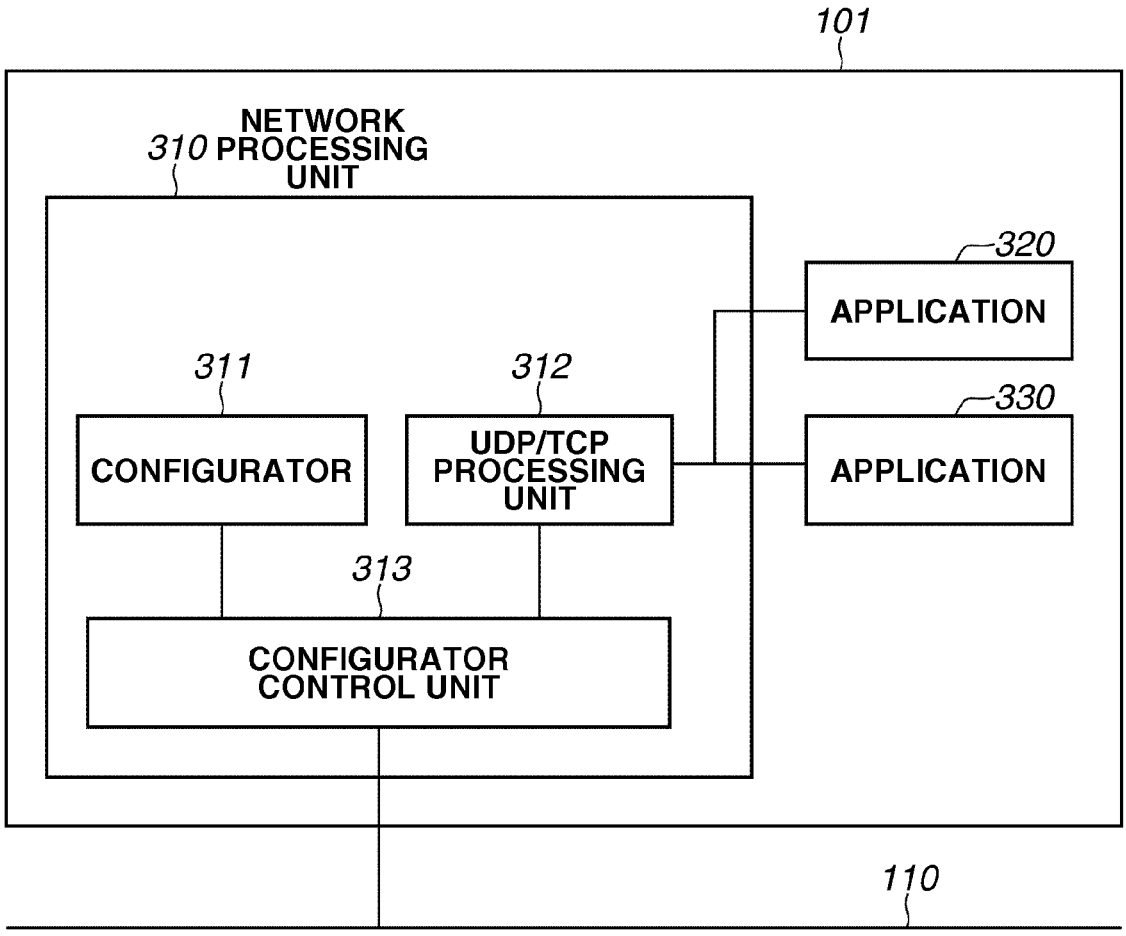

101
NETWORK
310 PROCESSING
UNIT
320
APPLICATION
311
312
330
CONFIGURATOR
UDP/TCP
PROCESSING
UNIT
APPLICATION
313
CONFIGURATOR
CONTROL UNIT
110

FIG.4

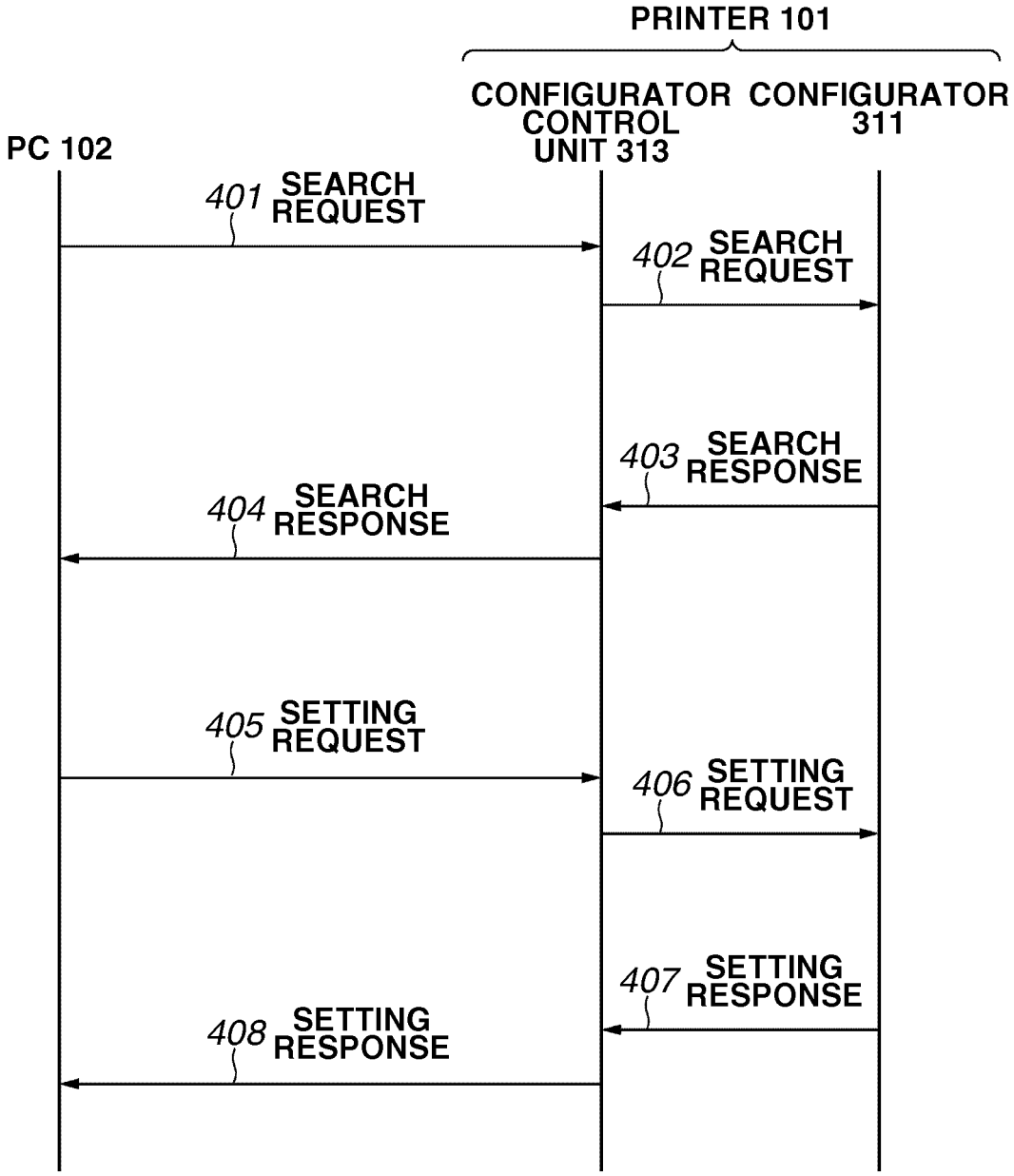

PRINTER 101
CONFIGURATOR CONTROL UNIT 313
CONFIGURATOR 311
PC 102
401 SEARCH REQUEST
402 SEARCH REQUEST
403 SEARCH RESPONSE
404 SEARCH RESPONSE
405 SETTING REQUEST
406 SETTING REQUEST
407 SETTING RESPONSE
408 SETTING RESPONSE

FIG.5

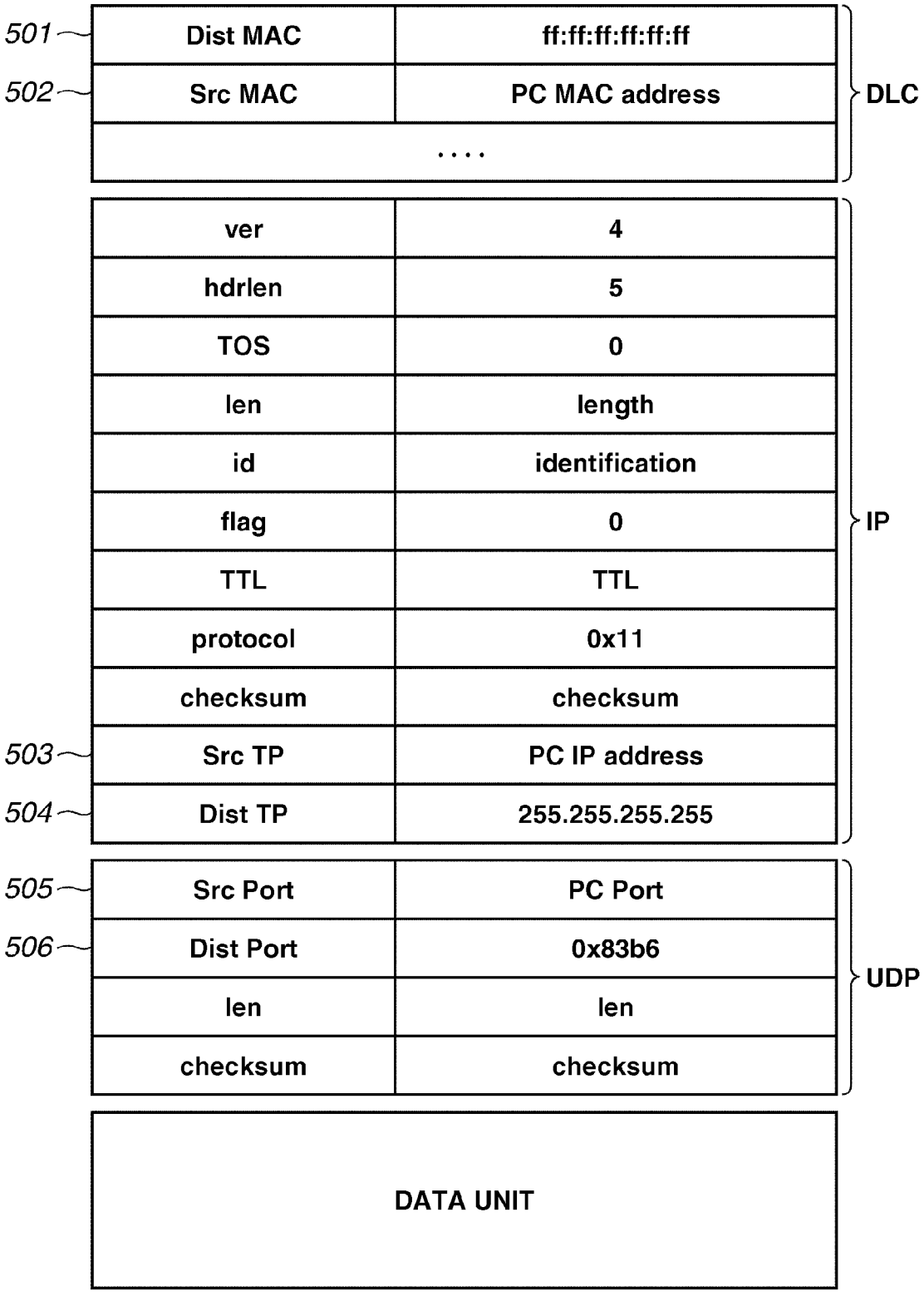

501
Dist MAC
ff:ff:ff:ff:ff:ff
502
Src MAC
PC MAC address
....
DLC
ver
4
hdrlen
5
TOS
0
len
length
id
identification
flag
0
TTL
TTL
protocol
0x11
checksum
checksum
503
Src TP
PC IP address
504
Dist TP
255.255.255.255
IP
505
Src Port
PC Port
506
Dist Port
0x83b6
len
len
checksum
checksum
UDP
DATA UNIT

FIG.6

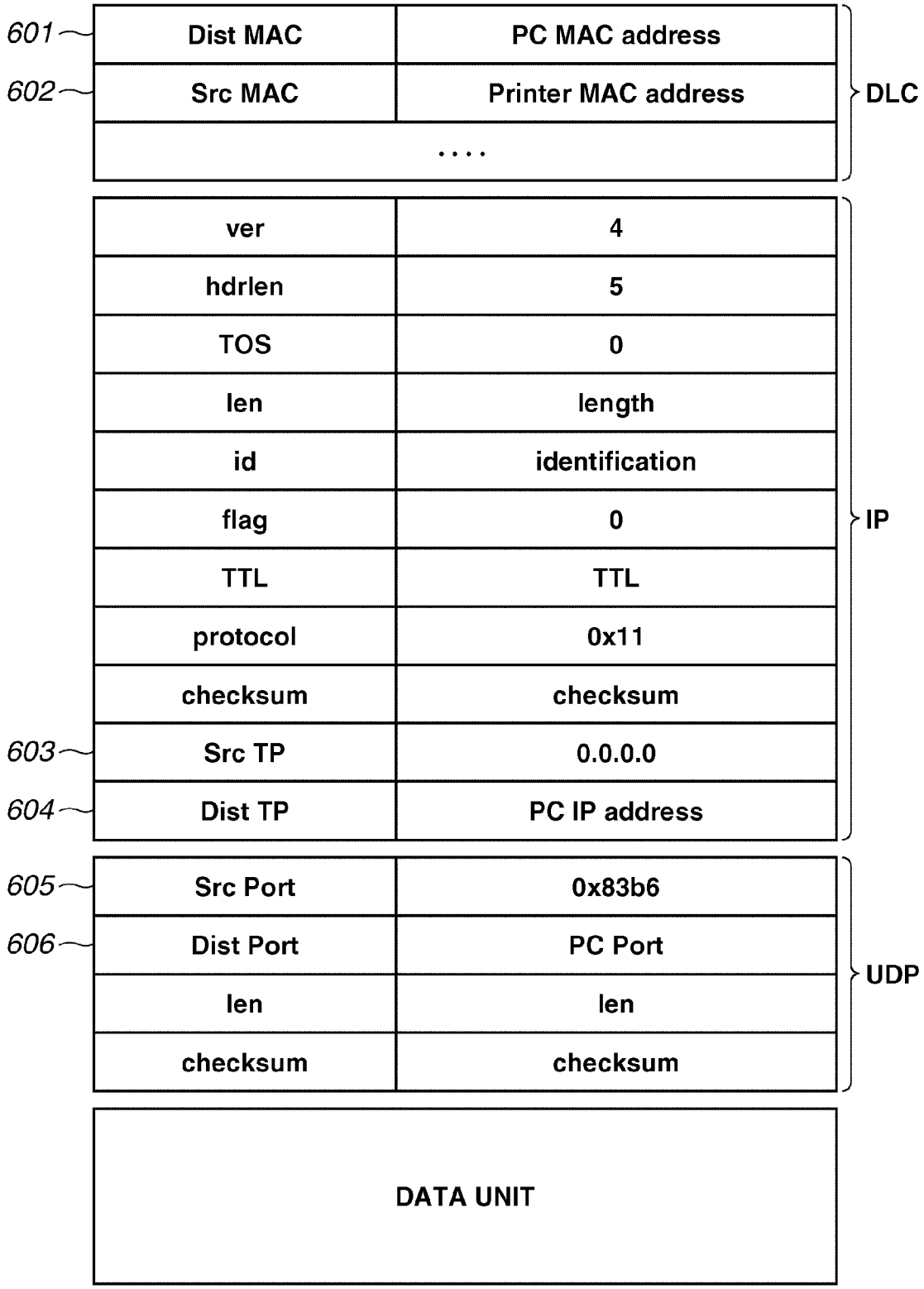

601
602
603
604
605
606
Dist MAC
PC MAC address
Src MAC
Printer MAC address
....
DLC
ver
4
hdrlen
5
TOS
0
len
length
id
identification
flag
0
TTL
TTL
protocol
0x11
checksum
checksum
Src TP
0.0.0.0
Dist TP
PC IP address
IP
Src Port
0x83b6
Dist Port
PC Port
len
len
checksum
checksum
UDP
DATA UNIT

FIG.7

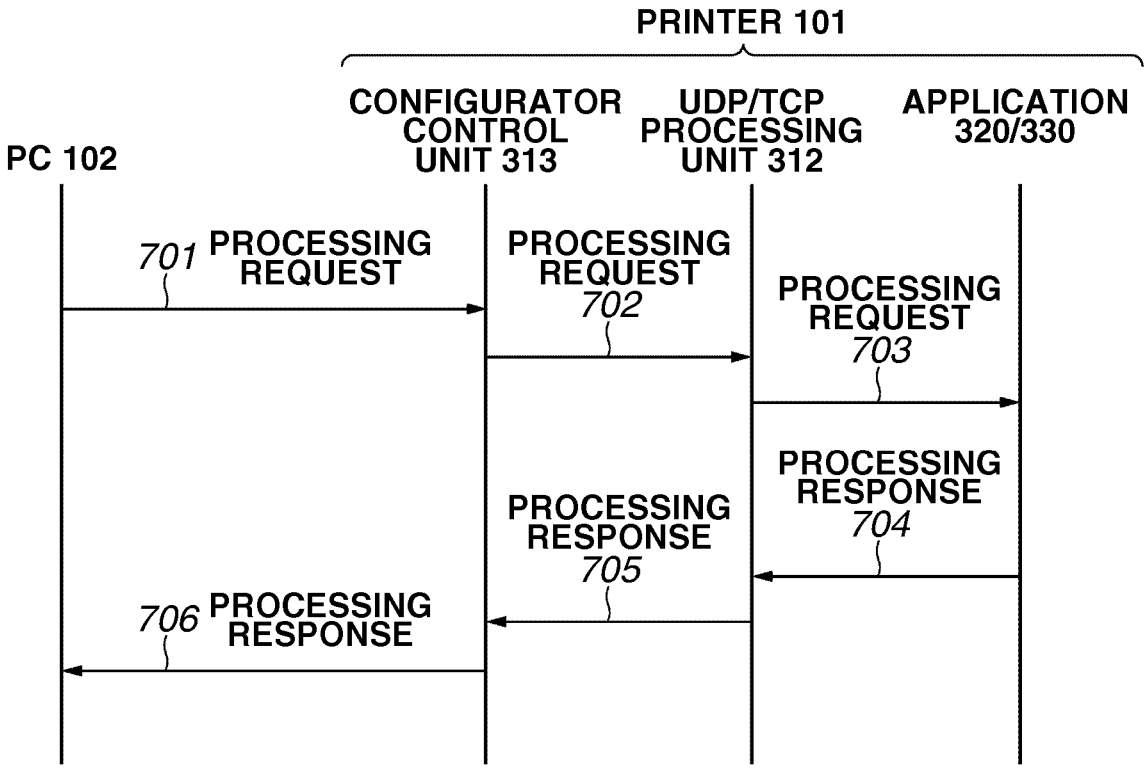

PRINTER 101
CONFIGURATOR CONTROL UNIT 313
UDP/TCP PROCESSING UNIT 312
APPLICATION 320/330
PC 102
701 PROCESSING REQUEST
PROCESSING REQUEST 702
PROCESSING REQUEST 703
PROCESSING RESPONSE 704
PROCESSING RESPONSE 705
706 PROCESSING RESPONSE

FIG.8

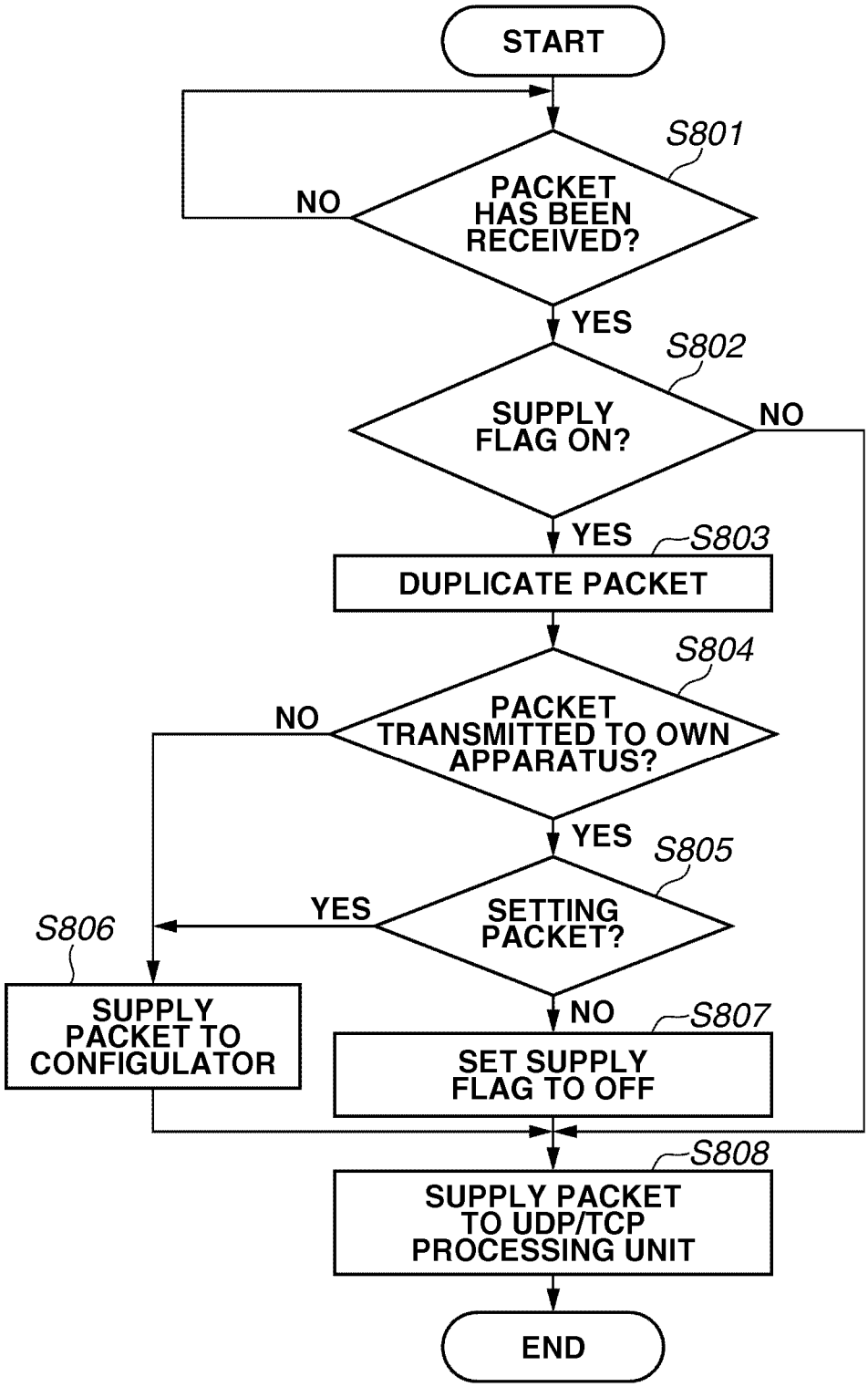

START
S801
PACKET HAS BEEN RECEIVED?
NO
YES
S802
SUPPLY FLAG ON?
NO
YES
S803
DUPLICATE PACKET
S804
PACKET TRANSMITTED TO OWN APPARATUS?
NO
YES
S805
SETTING PACKET?
YES
S806
SUPPLY PACKET TO CONFIGULATOR
NO
S807
SET SUPPLY FLAG TO OFF
S808
SUPPLY PACKET TO UDP/TCP PROCESSING UNIT
END

FIG.9

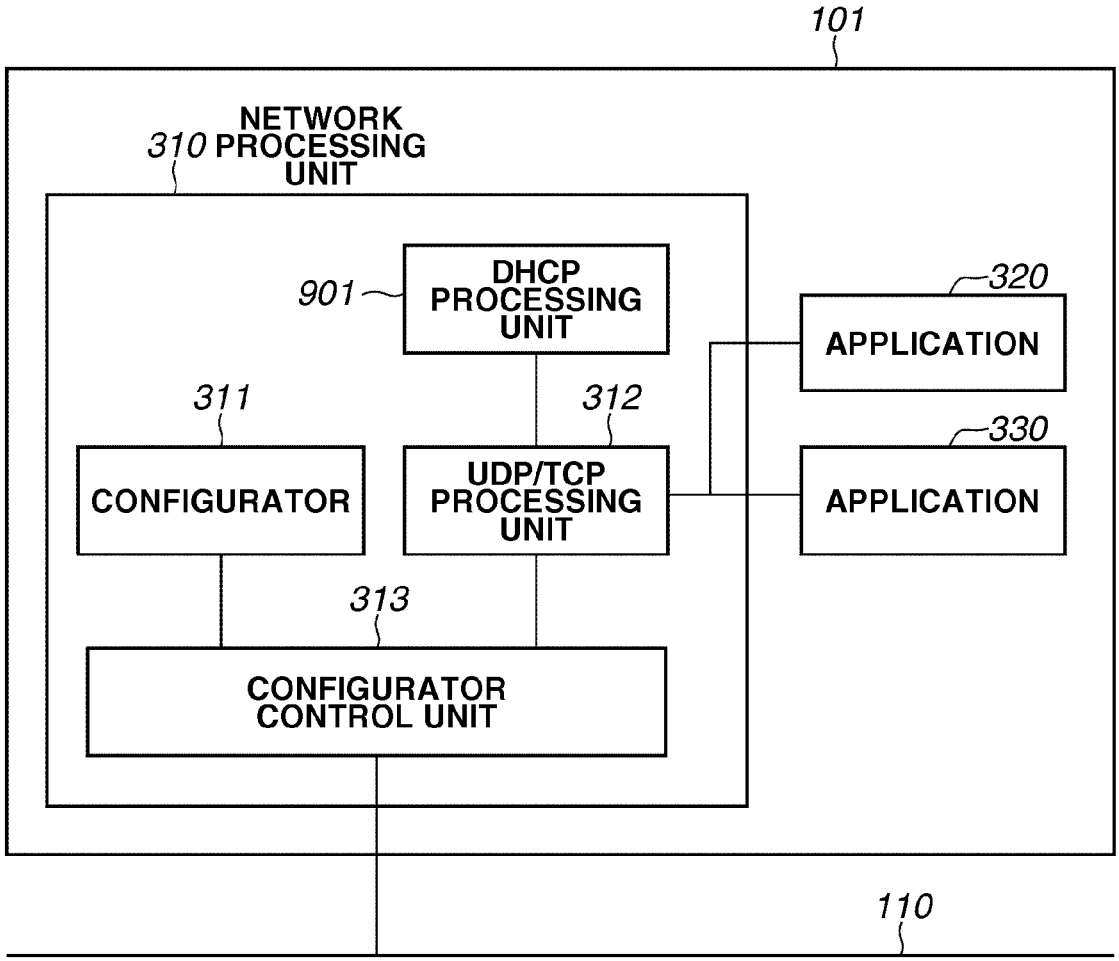

101
NETWORK
310 PROCESSING
UNIT
901
DHCP
PROCESSING
UNIT
320
APPLICATION
311
312
330
CONFIGURATOR
UDP/TCP
PROCESSING
UNIT
APPLICATION
313
CONFIGURATOR
CONTROL UNIT
110

FIG.10

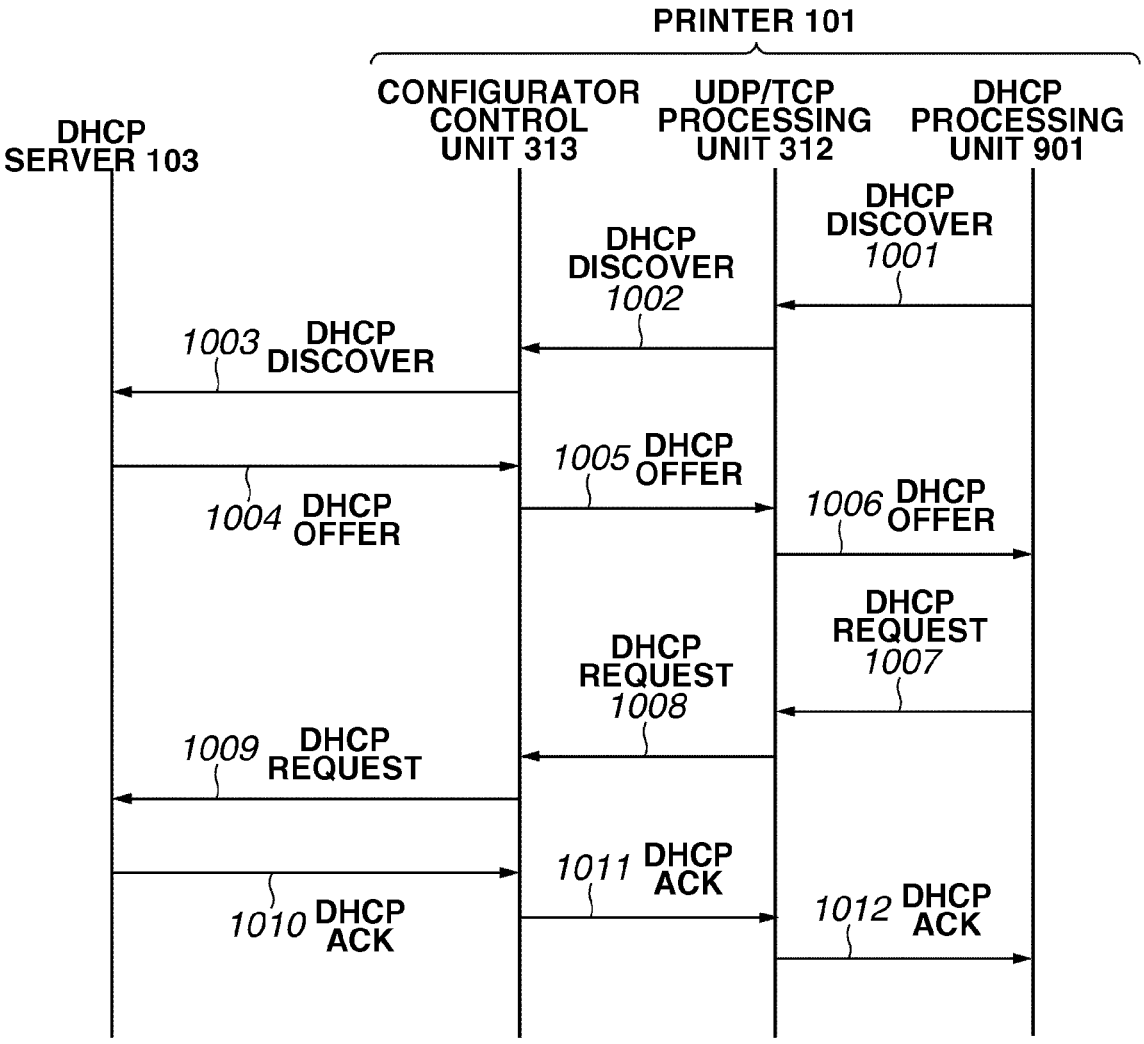
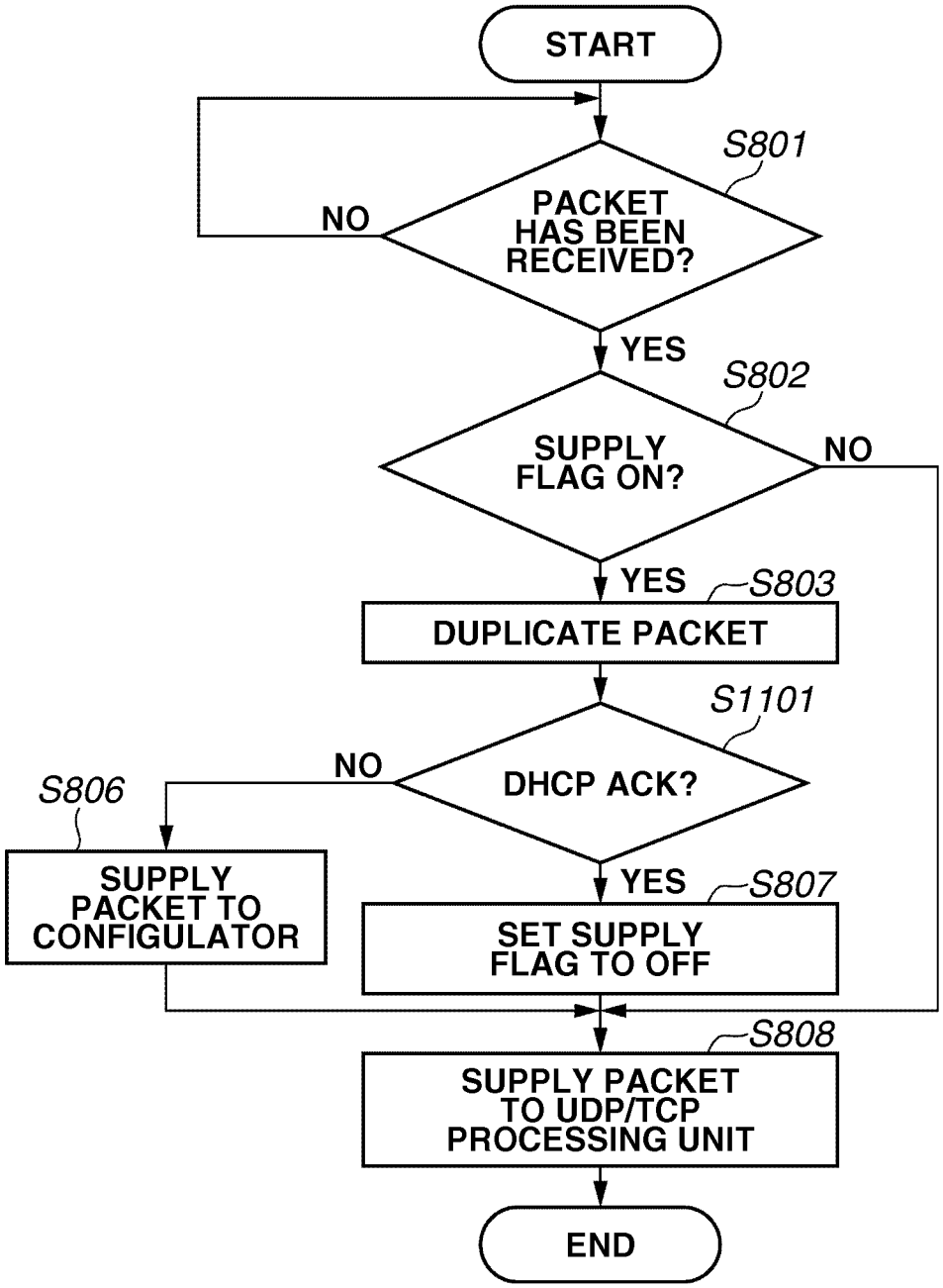

PRINTER 101
CONFIGURATOR CONTROL UNIT 313
UDP/TCP PROCESSING UNIT 312
DHCP PROCESSING UNIT 901
DHCP SERVER 103
DHCP DISCOVER 1001
DHCP DISCOVER 1002
1003 DHCP DISCOVER
1004 DHCP OFFER
1005 DHCP OFFER
1006 DHCP OFFER
DHCP REQUEST 1007
DHCP REQUEST 1008
1009 DHCP REQUEST
1010 DHCP ACK
1011 DHCP ACK
1012 DHCP ACK

FIG.11


START
S801
PACKET HAS BEEN RECEIVED?
NO
YES
S802
SUPPLY FLAG ON?
NO
YES
S803
DUPLICATE PACKET
S1101
DHCP ACK?
NO
S806
SUPPLY PACKET TO CONFIGULATOR
YES
S807
SET SUPPLY FLAG TO OFF
S808
SUPPLY PACKET TO UDP/TCP PROCESSING UNIT
END

COMMUNICATION APPARATUS, CONTROL METHOD THEREOF, AND STORAGE MEDIUM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a communication apparatus that can be connected to a network.

2. Description of the Related Art

Various conventional communication apparatuses have been widely known that are connected to networks such as a local area network (LAN) and the Internet to communicate with external apparatuses on the networks.

A protocol widely used for the communication apparatus to be connected to the network is an internet protocol. The internet protocol allocates an address (internet protocol (IP) address) unique to each apparatus so that the apparatuses can identify each other using the IP address. When a communication apparatus is connected to the network in order to put the apparatus into a usable state, various types of network settings including IP address setting are to be performed.

Conventionally, a manager has operated an operation unit of the communication apparatus to input each value to be set thereto. However, in recent years, network setting for the communication apparatus can be remotely performed from an external apparatus connected thereto via the network. For example, according to a method discussed in Japanese Patent Application No. 2000-122944, a setting packet is transmitted from a network management apparatus to a network device, and the network setting for the network device can be remotely performed.

More specifically, firstly, the network management apparatus transmits a search packet to a media access control (MAC) address which means broadcast transmission as a destination. Upon receiving a response packet from the network device that has received the search packet, the network management apparatus acquires the MAC address of the network device from the response packet. The network management apparatus transmits each value to be set for the network device to the acquired MAC address as a destination. The network device that has received the transmitted value sets the each value specified by the network management apparatus to the own apparatus and completes the network setting.

However, a following issue arises when the setting packet transmitted via the network is received and the network setting for the communication apparatus is performed according to data included in the setting packet.

Conventionally, when the network setting is remotely performed using the setting packet, the communication apparatus subjected to setting has analyzed all packets (to the MAC address of the own apparatus or the MAC address meaning the broadcast transmission) received via the network. That is because, in order to enable the network setting to be performed remotely from a state in which no IP address is set, the packet in a layer lower than that in which the IP address is treated is to be received and whether the received packet is the setting packet is to be determined.

However, once the network setting is completed, the setting packet does not need to be processed, and thus it is not necessary to determine whether the packet received via the network is the setting packet. Nevertheless, for the conventional apparatus, even after the network setting has been completed, all packets received via the network have been analyzed to determine whether the packets have been the setting packets. Accordingly, due to analysis of the packets, a processing load of the communication apparatus has been increased, thereby causing delay of other various types of processing such as drawing processing on an operation screen, printing processing, and image conversion processing.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, an apparatus includes a reception unit configured to receive a packet that is transmitted via a network, a setting unit configured to analyze the received packet and perform network setting for the apparatus according to data included in the received packet, a first determination unit configured to determine whether the received packet is a packet addressed to the apparatus, a second determination unit configured to determine whether the received packet is a setting packet for the network setting to be performed, and a control unit configured to, if the received packet is the packet addressed to the apparatus and is not the setting packet, control the setting unit not to analyze the packet.

Further features and aspects of the present invention will become apparent from the following detailed description of exemplary embodiments with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate exemplary embodiments, features, and aspects of the invention and, together with the description, serve to explain the principles of the invention.

FIG. **1** illustrates an entire communication system according to an exemplary embodiment of the present invention.

FIG. **2** is a block diagram illustrating a hardware configuration of a printer according to an exemplary embodiment of the present invention.

FIG. **3** is a block diagram illustrating a software configuration of a printer according to an exemplary embodiment of the present invention.

FIG. **4** is a sequence diagram illustrating processing for remotely performing network setting of a printer from a personal computer (PC) according to an exemplary embodiment of the present invention.

FIG. **5** illustrates contents of a search request according to an exemplary embodiment of the present invention.

FIG. **6** illustrates contents of a search response according to an exemplary embodiment of the present invention.

FIG. **7** is a sequence diagram illustrating processing in which an arbitrary application in a PC communicates with an application in a printer according to an exemplary embodiment of the present invention.

FIG. **8** is a flowchart illustrating a series of processing performed by a configurator control unit according to an exemplary embodiment of the present invention.

FIG. **9** is a block diagram illustrating a software configuration of a printer according to an exemplary embodiment of the present invention.

FIG. **10** is a sequence diagram illustrating processing for performing network setting for a printer using a dynamic host configuration protocol (DHCP) according to an exemplary embodiment of the present invention.

FIG. **11** is a flowchart illustrating a series of processing performed by a configurator control unit according to an exemplary embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

Various exemplary embodiments, features, and aspects of the invention will be described in detail below with reference to the drawings.

All combinations of features illustrated in exemplary embodiments are not necessarily essential for means to solve the issue in the invention.

FIG. **1** illustrates an entire communication system according to a first exemplary embodiment of the present invention. A printer **101** can be connected to a local area network (LAN) **110** and can communicate with a personal computer (PC) **102** and a DHCP server **103** via the LAN **110**. Other external apparatuses (not illustrated) are connected to the LAN **110**, and the printer **101** can communicate with these external apparatuses.

FIG. **2** is a block diagram illustrating a hardware configuration of the printer **101**. A control unit **210** including a central processing unit (CPU) **211** controls an entire operation of the printer **101**. The CPU **211** reads a control program stored in a read only memory (ROM) **212** to perform various types of control such as reading control and transmission control. A random access memory (RAM) **213** is used as a main memory of the CPU **211** and a temporary storage region of a working area.

A hard disk (HDD) **214** stores image data and various types of programs. An operation unit interface (I/F) **215** connects an operation unit **220** with the control unit **210**. The operation unit **220** includes a keyboard and a liquid crystal display unit having a touch panel function.

A printing unit I/F **216** connects a printing unit **230** with the control unit **210**. Image data to be printed by the printing unit **230** is transferred from the control unit **210** via the printing unit I/F **216** and printed on a recording medium thereby.

A network I/F **217** connects the control unit **210** (the printer **101**) to the LAN **110**. The network I/F **217** performs communication control for transmitting the image data and various types of information to the external apparatuses (including the PC **102** and the DHCP server **103**) via the LAN **110** and receiving the image data and various types of information from the external apparatuses via the LAN **110**. The printer **101** may be a multifunction peripheral (MFP) further including a reading unit that reads an image on a document to generate the image data.

FIG. **3** is a block diagram illustrating a software configuration of the printer **101**. A packet that is transmitted from the outside via the LAN **110** and received by the network I/F **217** is processed by a network processing unit **310**. The packet to be processed by the network processing unit **310** includes a MAC address (physical address) of the network I/F **217** (the printer **101**) specified as a destination or a MAC address meaning the broadcast transmission specified as a destination. A packet other than the packets described above is discarded without being transferred to the network processing unit **310**.

A configurator control unit **313** duplicates the packet input into the network processing unit **310** and supplies the packets to each of a configurator **311** and a user datagram protocol (UDP)/transmission control protocol (TCP) processing unit **312**. However, when the supply of the packet to the configurator **311** is stopped as described below, the input packet is supplied (transferred) only to the UDP/TCP processing unit **312** without being duplicated.

The configurator **311** analyzes the received packet to determine whether the received packet is a setting packet for network setting for the printer **101** and performs the network setting for the printer **101** when the received packet is determined as the setting packet.

FIG. **4** is a sequence diagram illustrating processing for remotely performing the network setting for the printer **101** from the PC **102**. When the network setting is performed on the printer **101** in which no IP address has been set, firstly, the PC **102** performs broadcast transmission of a search request **401** illustrated in FIG. **5**.

As illustrated in FIG. **5**, for a destination MAC address **501** of the search request **401**, "ff:ff:ff:ff:ff:ff" that means the broadcast transmission is specified. For a transmission source MAC address **502** of the search request **401**, the MAC address allocated to the network I/F of the PC **102** is specified.

For a destination IP address **504** of the search request **401**, "255. 255. 255. 255" that means the broadcast transmission is specified. For a transmission source IP address **503** of the search request **401**, the IP address allocated to the network I/F of the PC **102** is specified.

For a destination port **506** of the search request **401**, "0*83b6" for identifying that this packet is the setting packet for the network setting to be performed by the configurator **311** is specified. For a transmission source port **505** of the search request **401**, port information to be used by the PC **102** is specified.

The search request **401** includes a data unit following a data link control (DLC) header, an IP header, and a UDP header. A setting request **405** described below describes each value to be set for the printer **101** in the data unit.

Upon receiving the search request **401**, the configurator control unit **313** duplicates the received search request **401** and supplies one of the search requests **401** to the configurator **311** and another to the UDP/TCP processing unit **312**. FIG. **4** illustrates that the search request **402** is supplied (transferred) only to the configurator **311**, however along with the transfer of the search request **402** to the configurator **311**, the search request **402** is also transferred to the UDP/TCP processing unit **312**.

Upon receiving the search request **402**, the configurator **311** analyzes a part of or all of the DLC header, the IP header, the UDP header, and the data unit of the received packet to determine the contents of the packet. As a result, when the configurator **311** determines that the received packet is the search request, the configurator **311** transmits a search response **403** in response to the search request **402**. The search response **403** is transferred to the PC **102** as a search response **404** via the configurator control unit **313**.

FIG. **6** illustrates the search response **404**. For a destination MAC address **601** of the search response **404**, the MAC address (specified as the transmission source MAC address **502** of the search request **401**) allocated to the network I/F of the PC **102** is specified. For a transmission source MAC address **602** of the search response **404**, the MAC address allocated to the network I/F **217** of the printer **101** is specified.

For a destination IP address **604** of the search response **404**, the IP address allocated to the network I/F of the PC **102** is specified. For a transmission source IP address **603** of the search response **404**, "0. 0. 0. 0" which is set for the printer **101** as an initial value (factory shipping value) of the IP address is specified.

For a destination port **606** of the search response **404**, port information to be used by the PC **102** is specified. For a transmission source port **605** of the search response **404**, "0*83b6" specified as the destination port **506** of the search request **401** is specified.

The search response **404** includes a data unit following the DLC header, the IP header, and the UDP header.

Upon receiving the search response **404**, the PC **102** transmits to the printer **101** the setting request **405** including the data unit in which each value to be set for the printer **101** is described. In the setting request **405**, the MAC address that is specified in the transmission source MAC address **602** of the search response **404** and allocated to the network I/F **217** of the printer **101** is specified as the destination MAC address.

Upon receiving the setting request **405**, the configurator control unit **313** duplicates the received setting request **405**, and supplies one of the setting requests **405** to the configurator **311** and another to the UDP/TCP processing unit **312**. FIG. **4** illustrates that the setting request **406** is supplied (transferred) only to the configurator **311**, however along with the transfer of the setting request **406** to the configurator **311**, the setting request **406** is also transferred to the UDP/TCP processing unit **312**.

Upon receiving the setting request **406**, the configurator **311** analyzes a part of or all of the DLC header, the IP header, the UDP header, and the data unit of the received packet to discriminate the contents of the packet. As a result, when the configurator **311** determines that the received packet is the setting request, based on each value described in the data unit of the setting request **406**, the configurator **311** performs the network setting for the printer **101**.

After the network setting is completed, the configurator **311** transmits a setting response **407** for notifying the PC **102** of the completion of the network setting. The setting response **407** is transferred to the PC **102** as a setting response **408** via the configurator control unit **313**.

By the processing described above, the network setting can be remotely performed from the PC **102** on the printer **101** in which the network setting is not performed (no IP address has been set).

FIG. **7** is a sequence diagram illustrating processing in which an arbitrary application in the PC **102** communicates with an application **320** or **330** in the printer **101**. In order to enable the application **320** or **330** to communicate with the external apparatus on the LAN **110**, the network setting (including setting of the IP address) for the printer **101** is to be completed.

Firstly, the PC **102** transmits a processing request **701** to the printer **101**. For a destination MAC address of the processing request **701**, the MAC address allocated to the network I/F **217** of the printer **101** is specified. For a transmission source MAC address of the processing request **701**, the MAC address allocated to the network I/F of the PC **102** is specified.

For a destination IP address of the processing request **701**, the IP address set for the network I/F **217** (the printer **101**) according to the sequence illustrated in FIG. **4** is specified. For a transmission source IP address of the processing request **701**, the IP address allocated to the network I/F of the PC **102** is specified.

For a destination port of the processing request **701**, port information for identifying the application **320** or the application **330** is specified. For a transmission source port of the processing request **701**, port information to be used by the PC **102** is specified.

Upon receiving the processing request **701**, the configurator control unit **313** duplicates the received processing request **701**, and supplies one of the processing requests **701** to the configurator **311** and another to the UDP/TCP processing unit **312**. FIG. **7** illustrates that the processing request **702** is supplied (transferred) only to the UDP/TCP processing unit **312**, however, along with the transfer of the processing request **702** to the UDP/TCP processing unit **312**, the processing request **702** is also transferred to the configurator **311**.

Upon receiving the processing request **702**, the UDP/TCP processing unit **312** analyzes the IP header and the UDP header of the received packet to specify the application to be the destination to which the packet is transferred. A processing request **703** is transferred to the specified application **320** or **330**.

The application **320** or **330** that has received the processing request **703** performs processing and transmits a processing result as a processing response **704**. The processing response **704** is transferred to the configurator control unit **313** as a processing response **705** via the UDP/TCP processing unit **312**. The configurator control unit **313** that has received the processing response **705** transmits a processing response **706** to the PC **102**.

By the processing described above, after the network setting is performed (the IP address is set), the application **320** or **330** of the printer **101** can communicate with the external apparatuses on the LAN **110**.

After the network setting for the printer **101** is completed, the configurator control unit **313** has no opportunities to process the setting packet. Nevertheless, the conventional apparatus supplies (transfers) all packets received by the network processing unit **310** to the configurator **311** after the network setting is completed.

More specifically, the configurator **311** analyzes all packets received by the network processing unit **310**, thereby generating a great load of the printer **101** (control unit **210**). The load causes delay of other various types of processing (such as drawing processing on an operation screen, printing processing, and image conversion processing) performed by the printer **101** (control unit **210**).

Thus, according to the first exemplary embodiment, when the packet that is addressed to the printer **101** and is not the setting packet for the network setting to be performed by the configurator **311** is received, the supply of the received packet to the configurator **311** is stopped.

When the packet is transmitted to the printer **101** from the external apparatus on the LAN **110**, the MAC address as the destination should be known. However, normally, the application in the external apparatus specifies the destination with the IP address. Thus, the external apparatus performs broadcast transmission of an address resolution protocol (ARP) request, which is regulated by Request for Comments (RFC) **826**, to inquire the IP address specified by the application.

When the IP address specified by the ARP request corresponds to the IP address set for the own apparatus, the printer **101** that has received the ARP request returns the MAC address of the own apparatus as a response. The external apparatus can find the MAC address of the printer **101** by the response from the printer **101**.

On the other hand, when the appropriate network setting is not performed on the printer **101**, the printer **101** does not respond to the ARP request. Therefore, the external apparatus cannot acquire the MAC address of the printer **101**. In other words, when the packet (except for the setting packet for the network setting to be performed by the configurator **311**) including the MAC address of the printer **101** as the destination is transmitted, it is determined that the network setting for the printer **101** has been completed.

Thus, according to the first exemplary embodiment, when the packet that is addressed to the printer **101** and is not the setting packet for the network setting to be performed by the configurator **311** is received, it is determined that the network setting has been completed. In this case, by stopping the supply of the received packet to the configurator **311**, it can be

set so that the configurator **311** does not analyze the packet, and thus the processing load of the printer **101** (control unit **210**) can be reduced.

FIG. **8** is a flowchart illustrating a series of processing performed by the configurator control unit **313** to stop the supply of the packet to the configurator **311**. Each operation described in the flowchart illustrated in FIG. **8** can be realized when the CPU **211** of the printer **101** executes the control program. Further, the processing in the flowchart illustrated in FIG. **8** starts when a power supply of the printer **101** is turned on.

In step S**801**, it is determined whether a packet has been received. When the packet has been received (YES in step S**801**), the processing proceeds to step S**802**. If not (NO in step S**801**), the processing waits in step S**801** until the packet is received.

In step S**802**, whether to supply the packet to the configurator **311** is determined by determining whether a supply flag is set to ON or OFF. After the power supply of the printer **101** is turned on, since the supply of the packet to the configurator **311** is not stopped, the supply flag is set to ON. However, in step S**807** that will be described below, when the supply of the packet to the configurator **311** is stopped, the supply flag is set to OFF.

If the supply of the packet to the configurator **311** is stopped in step S**807**, when the power supply of the printer **101** is once turned off and then turned on again, the supply flag is returned to the ON state. Therefore, by turning on the power supply of the printer **101** again, the supply of the packet to the configurator **311** can be resumed. With this arrangement, the network setting using the configurator **311** can be changed.

As a result of the determination in step S**802**, if it is determined that the packet is to be supplied to the configurator **311** (YES in step S**802**), the processing proceeds to step S**803**. On the other hand, if it is determined that the packet is not to be supplied to the configurator **311** (NO in step S**802**), the processing proceeds to step S**808** and the received packet is supplied (transferred) only to the UDP/TCP processing unit **312**. In this case, the supply (transfer) of the packet to the configurator **311** is not performed.

In step S**803**, the received packet is duplicated. In the following step S**804**, it is determined whether the received packet is addressed to the own apparatus (printer **101**). When the destination MAC address of the received packet corresponds to the MAC address allocated to the network I/F **217** of the printer **101**, it is determined that the received packet is addressed to the own apparatus (YES in step S**804**). On the other hand, when the destination MAC address means the broadcast transmission, it is determined that the received packet is not addressed to the own apparatus (NO in step S**804**).

As a result of the determination in step S**804**, if it is determined that the received packet is not addressed to the own apparatus (NO in step S**804**), then in step S**806**, the received packet is supplied (transferred) to the configurator **311**, and in step S**808**, the received packet is further supplied (transferred) to the UDP/TCP processing unit **312**.

As a result of the determination in step S**804**, if it is determined that the received packet is addressed to the own apparatus (YES in step S**804**), the processing proceeds to step S**805**. In step S**805**, it is determined whether the received packet is the setting packet (e.g., the setting request **405**) for the network setting to be performed by the configurator **311**. The configurator control unit **313** previously stores "0*83b6" that is identification information (port information) for identifying the setting packet. When it is determined that the port information included in the received packet corresponds to "0*83b6" that is stored in the configurator control unit **313**, it is determined that the received packet is the setting packet.

As a result of the determination in step S**805**, if it is determined that the received packet is the setting packet (YES in step S**805**), then in step S**806**, the received packet is supplied (transferred) to the configurator **311**, and in step S**808**, the received packet is further supplied (transferred) to the UDP/TCP processing unit **312**.

As a result of the determination in step S**805**, if it is determined that the received packet is not the setting packet (NO in step S**805**), the processing proceeds to step S**807** and the supply flag is set to OFF. Accordingly, the supply (transfer) of the received packet to the configurator **311** is stopped. The processing, then, proceeds to step S**808** and supplies (transfers) the received packet only to the UDP/TCP processing unit **312**. In this case, since the supply (transfer) of the packet to the configurator **311** is not performed, the duplicated packet is discarded.

By the processing described above, it can be set so that the configurator **311** does not analyze the received packet, when it is determined that the network setting has been completed. With this arrangement, the processing load of the printer **101** (control unit **210**) can be reduced.

Next, a second exemplary embodiment of the present invention will be described. The printer **101** that will be described in the second exemplary embodiment can perform not only the network setting by the configurator **311** but also the network setting using a dynamic host configuration protocol (DHCP).

When the network setting is performed using the DHCP, the printer **101** communicates with an external server (a DHCP server **103**). When a DHCP acknowledgment (ACK) included in a command group used by the DHCP is received, it is determined that the network setting for the printer **101** has been completed (actually, just about to be completed), and the supply of the packet to the configurator **311** is stopped. In the present exemplary embodiment, the same numeral reference is given to the configuration similar to that in the first exemplary embodiment described above, and detailed description thereof will not be repeated.

FIG. **9** illustrates a software configuration of the printer **101**. Compared with the software configuration illustrated in FIG. **3**, a DHCP processing unit **901** is newly provided in the present exemplary embodiment. The DHCP processing unit **901** performs the network setting for the printer **101** using the DHCP that is different from the protocol used by the configurator **311**.

FIG. **10** is a sequence diagram illustrating processing for performing network setting for the printer **101** using the DHCP.

Firstly, the DHCP processing unit **901** transmits a DHCP DISCOVER **1001** to the UDP/TCP processing unit **312**. The UDP/TCP processing unit **312** transfers the received DHCP DISCOVER **1001** to the configurator control unit **313** as a DHCP DISCOVER **1002**. The configurator control unit **313** performs broadcast transmission of the received DHCP DISCOVER **1002** to the LAN **110** as a DHCP DISCOVER **1003**.

Upon receiving the DHCP DISCOVER **1003**, the DHCP **103** transmits a DHCP OFFER **1004** which describes a candidate of a value (IP address) that can be set to the printer **101** as a response.

The configurator control unit **313** that has received the DHCP OFFER **1004** duplicates the received DHCP OFFER **1004**, and supplies one of the DHCP OFFERs **1004** to the configurator **311** and another to the UDP/TCP processing unit **312**. FIG. **10** only illustrates that a DHCP OFFER **1005** is

supplied (transferred) to the UDP/TCP processing unit **312**. However, along with the transfer of the DHCP OFFER **1005** to the UDP/TCP processing unit **312**, the DHCP OFFER **1005** is also transferred to the configurator **311**.

The UDP/TCP processing unit **312** transfers the received DHCP OFFER **1005** to the DHCP processing unit **901** as a DHCP OFFER **1006**. If candidates included in the DHCP OFFER **1006** include a value that has been used in the past, the value is selected. If the candidates do not include the value that has been used in the past, an arbitrary value is selected according to a predetermined condition.

In order to notify the DHCP server **103** of the selected value, a DHCP REQUEST **1007** is transmitted to the UDP/TCP processing unit **312**. The UDP/TCP processing unit **312** transfers the received DHCP REQUEST **1007** to the configurator control unit **313** as a DHCP REQUEST **1008**. The configurator control unit **313** performs broadcast transmission of the received DHCP REQUEST **1008** to the LAN **110** as a DHCP REQUEST **1009**.

The DHCP server **103** that has received the DHCP REQUEST **1009** checks the value selected by the DHCP processing unit **901** and transmits a DHCP ACK **1010** to the printer **101** as a response.

The configurator control unit **313** that has received the DHCP ACK **1010** transfers a DHCP ACK **1011** to the UDP/TCP processing unit **312**.

The UDP/TCP processing unit **312** transfers the received DHCP ACK **1011** to the DHCP processing unit **901** as a DHCP ACK **1012**. After checking the DHCP ACK **1012**, the DHCP processing unit **901** performs the network setting for the own apparatus based on the selected value, and ends the processing.

By the processing described above, the network setting for the printer **101** can be performed using the DHCP.

FIG. **11** is a flowchart illustrating a series of processing performed by the configurator control unit **313** to stop the supply of the packet to the configurator **311**. Each operation described in the flowchart illustrated in FIG. **11** can be realized when the CPU **211** of the printer **101** executes the control program. In the flowchart illustrated in FIG. **11**, in place of steps S**804** and S**805** in the flowchart illustrated in FIG. **8**, processing in step S**1011** is added.

In step S**801**, it is determined whether a packet has been received. When the packet has been received (YES in step S**801**), the processing proceeds to step S**802**. If not (NO in step S**801**), the processing waits in step S**801** until the packet is received.

In step S**802**, whether to supply the packet to the configurator **311** is determined by determining whether a supply flag is set to ON or OFF. After the power supply of the printer **101** is turned on, since the supply of the packet to the configurator **311** is not stopped, the supply flag is set to ON. However, in step S**807** that will be described below, when the supply of the packet to the configurator **311** is stopped, the supply flag is set to OFF.

If the supply of the packet to the configurator **311** is stopped in step S**807**, when the power supply of the printer **101** is once turned off and then turned on again, the supply flag is returned to the ON state. Therefore, by turning on the power supply of the printer **101** again, the supply of the packet to the configurator **311** can be resumed. With this arrangement, the network setting using the configurator **311** can be changed.

As a result of the determination in step S**802**, if it is determined that the packet is to be supplied to the configurator **311** (YES in step S**802**), the processing proceeds to step S**803**. On the other hand, if it is determined that the packet is not to be supplied to the configurator **311** (NO in step S**802**), the processing proceeds to step S**808** and the received packet is supplied (transferred) only to the UDP/TCP processing unit **312**. In this case, the supply (transfer) of the packet to the configurator **311** is not performed.

In step S**803**, the received packet is duplicated. In the following step S**1101**, it is determined whether the received packet is the DHCP ACK included in the packet group which is transmitted or received via the DHCP. As a result of the determination, if it is determined that the received packet is not the DHCP ACK (NO in step S**1101**), then in step S**806**, the received packet is supplied (transferred) to the configurator **311**, and in step S**808**, the received packet is further supplied (transferred) to the UDP/TCP processing unit **312**.

As a result of the determination in step S**1101**, if it is determined that the received packet is the DHCP ACK (YES in step S**1101**), the processing proceeds to step S**807** and the supply flag is set to OFF. Accordingly, the supply (transfer) of the received packet to the configurator **311** is stopped. The processing, then, proceeds to step S**808** and supplies (transfers) the received packet only to the UDP/TCP processing unit **312**. In this case, since the supply (transfer) of the packet to the configurator **311** is not performed, the duplicated packet is discarded.

By the processing described above, it can be set so that the configurator **311** does not analyze the received packet, when it is determined that the network setting has been completed. With this arrangement, the processing load of the printer **101** (control unit **210**) can be reduced.

Aspects of the present invention can also be realized by a computer of a system or apparatus (or devices such as a CPU or MPU) that reads out and executes a program recorded on a memory device to perform the functions of the above-described embodiment (s), and by a method, the steps of which are performed by a computer of a system or apparatus by, for example, reading out and executing a program recorded on a memory device to perform the functions of the above-described embodiment (s). For this purpose, the program is provided to the computer for example via a network or from a recording medium of various types serving as the memory device (e.g., computer-readable medium).

While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all modifications, equivalent structures, and functions.

This application claims priority from Japanese Patent Application No. 2010-068287 filed Mar. 24, 2010, which is hereby incorporated by reference herein in its entirety.

What is claimed is:

1. A communication apparatus comprising:

a reception unit configured to receive a packet transmitted from an external apparatus on a network;

a setting unit configured to set an IP address of the communication apparatus, based on a setting packet received by the reception unit; and

a controlling unit configured to maintain the setting unit in an enable state until the reception unit receives a predetermined packet, a type of which is different from a type of the setting packet, and put the setting unit into a disable state on condition that the reception unit receives the predetermined packet,

wherein the setting unit sets the IP address of the communication apparatus based on the setting packet received by the reception unit while the controlling unit maintains the setting unit in the enable state, and

wherein the setting unit does not set the IP address of the communication apparatus, after the controlling unit puts the setting unit into the disable state, even if the reception unit receives the setting packet.

2. A communication method comprising:

receiving a packet transmitted from an external apparatus on a network;

setting IP address of a communication apparatus, based on the received setting packet; and

controlling to maintain the setting in an enable state until the receiving receives a predetermined packet, a type of which is different from a type of the setting packet, and putting the setting into a disable state on condition that the receiving receives the predetermined packet,

wherein the setting sets the IP address of the communication apparatus based on the setting packet received while the controlling maintains the setting in the enable state, and

wherein the setting does not set the IP address of the communication apparatus, after the controlling puts the setting into the disable state, even if the receiving receives the setting packet.

3. A non-transitory computer readable medium for storing a computer-executable program of instructions for causing a computer to perform a communication method comprising:

receiving a packet transmitted from an external apparatus on a network;

setting an IP address of a communication apparatus, based on the received setting packet; and

controlling to maintain the setting in an enable state until the receiving receives a predetermined packet, a type of which is different from a type of the setting packet, and put the setting into a disable state on condition that the receiving receives the predetermined packet,

wherein the setting sets the IP address of the communication apparatus based on the setting packet received while the controlling maintains the setting in the enable state, and

wherein the setting does not set the IP address of the communication apparatus, after the controlling puts the setting into the disable state, even if the receiving receives the setting packet.

4. The communication apparatus according to claim **1**, further comprising:

a supply unit configured to supply the setting packet received by the reception unit to the setting unit according to a supply flag,

wherein the supply flag is in an ON state in the enable state of the setting unit, and the supply flag is in an OFF state in the disable state of the setting unit.

5. The communication apparatus according to claim **1**, wherein the communication apparatus is a printing apparatus capable of performing printing processing.

6. The communication apparatus according to claim **1**, wherein the controlling unit determines whether or not a packet received by the reception unit is the setting packet, based on identification information included in the packet received by the reception unit.

7. The communication apparatus according to claim **6**,

wherein the identification information is port information, and

wherein, in a case where the port information indicates a specific port, the controlling unit determines that the packet received by the reception unit is the setting packet.

8. The communication apparatus according to claim **1**, wherein the controlling unit returns the setting unit from the disable state to the enable state if the communication apparatus is turned on again.

9. A communication apparatus comprising:

a reception unit configured to receive a packet transmitted from an external apparatus on a network;

a setting unit configured to set an IP address of the communication apparatus, based on a setting packet received by the reception unit; and

a controlling unit configured to, in a case where the reception unit receives a packet of which a destination MAC address corresponds to a MAC address of the communication apparatus and is different from the setting packet, change a state of the communication apparatus from an enable state in which the setting unit sets the IP address of the communication apparatus to a disable state in which the setting unit does not set the IP address of the communication apparatus,

wherein in a case where the communication apparatus is in the enable state, the setting unit sets the IP address of the communication apparatus based on the setting packet received by the reception unit, and

wherein in a case where the communication apparatus is in the disable state, even if the reception unit receives the setting packet, the setting unit does not set the IP address of the communication apparatus based on the setting packet received by the reception unit.

10. The communication apparatus according to claim **9**, further comprising:

a supply unit configured to supply the setting packet received by the reception unit to the setting unit,

wherein in a case where the communication apparatus is in the enable state, the supply unit supplies the setting packet to the setting unit, and

in a case where the communication apparatus is in the disable state, the supply unit does not supply the setting packet to the setting unit.

11. The communication apparatus according to claim **9**, wherein the communication apparatus is a printing apparatus capable of performing printing processing.

12. The communication apparatus according to claim **9**, wherein in a case where the communication apparatus restarts, the controlling unit sets the communication apparatus such that the communication apparatus is put in the enable state.

13. A communication method of a communication apparatus comprising:

receiving a packet transmitted from an external apparatus on a network;

setting an IP address of the communication apparatus, based on a setting packet received by the receiving; and

changing, in a case where the receiving receives a packet of which a destination MAC address corresponds to a MAC address of the communication apparatus and is different from the setting packet, a state of the communication apparatus from an enable state in which the setting sets the IP address of the communication apparatus to a disable state in which the setting does not set the IP address of the communication apparatus,

wherein in a case where the communication apparatus is in the enable state, the setting sets the IP address of the communication apparatus based on the received setting packet, and

wherein in a case where the communication apparatus is in the disable state, even if the receiving receives the setting

packet, the setting does not set the IP address of the communication apparatus based on the received setting packet.

14. A non-transitory computer readable medium for storing a computer-executable program of instructions for causing a computer to perform a communication method of a communication apparatus comprising:

receiving a packet transmitted from an external apparatus on a network;

setting an IP address of the communication apparatus, based on a setting packet received by the receiving; and

changing, in a case where the receiving receives a packet of which a destination MAC address corresponds to a MAC address of the communication apparatus and is different from the setting packet, a state of the communication apparatus from an enable state in which the setting sets the IP address of the communication apparatus to a disable state in which the setting does not set the IP address of the communication apparatus,

wherein in a case where the communication apparatus is in the enable state, the setting sets the IP address of the communication apparatus based on the received setting packet, and

wherein in a case where the communication apparatus is in the disable state, even if the receiving receives the setting packet, the setting does not set the IP address of the communication apparatus based on the received setting packet.

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